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II. Solution by G. W. GREENWOOD, Dunbar, Pa.

Taking horizontal and vertical axes through the point of projection and in its plane, the path of a particle with initial velocity v , and making initially an angle θ with the vertical, is given by

$$x = v \sin \theta t, \quad y = v \cos \theta t - \frac{1}{2}gt^2.$$

Eliminating t , we get as the equation to the path described,

$$x^2 - \frac{2v^2 x \sin \theta \cos \theta}{g} + \frac{2v^2 \sin^2 \theta y}{g} = 0; \text{ i. e., } \left[x - \frac{v^2 \sin 2\theta}{2g} \right]^2 + \left[y - \frac{v^2 \cos 2\theta}{2g} \right] \\ = \left[y - \frac{v^2}{2g} \right],$$

which is a parabola whose focus is

$$\frac{v^2 \sin 2\theta}{2g}, \quad \frac{v^2 \cos 2\theta}{2g}.$$

Now taking horizontal and vertical axes through the center of the wheel, and in its plane, the wheel being supposed to revolve clock-wise, the focus of the parabola described by a particle from the point $(-a \cos \theta, a \sin \theta)$, a being the radius of the wheel, is given by

$$x = \frac{v^2 \sin 2\theta}{2g} - a \cos \theta, \quad y = \frac{v^2 \cos 2\theta}{2g} + a \sin \theta,$$

which is the equation of the required locus in terms of the parameter θ .

An excellent solution of this problem was received from G. B. M. Zerr.

CALCULUS.

241. Proposed by C. N. SCHMALL, 89 Columbia Street, New York City.

$$\text{Differentiate } y = 1 + \frac{x}{1 + \frac{x}{1 + \frac{x}{1 + \frac{x}{1 + \text{etc.}}}}}$$

Solution by J. SCHEFFER, A. M., Hagerstown, Md.; FRANCIS RUST, Allegheny, Pa., and the PROPOSER.

The continued fraction is equivalent to $\frac{1}{2} + \sqrt{\left(\frac{1}{4} + x\right)}$.

$$\text{Hence, } y = \frac{1}{2} + \sqrt{\left(\frac{1}{4} + x\right)}, \text{ and } \frac{dy}{dx} = \frac{1}{\sqrt{1 + 4x}}.$$

Also solved by G. B. M. Zerr, G. W. Greenwood, and A. H. Holmes.